

PERFORMANCE REPORT

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STATEWIDE FRESHWATER FISHERIES MONITORING AND MANAGEMENT PROGRAM

2011 Survey Report

Big Creek Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Big Creek Reservoir were surveyed in 2012 using electrofishing and gill netting. Aquatic vegetation and habitat surveys could not be conducted during summer 2011 because there was no boater access because of low reservoir water elevation brought on by an extended drought. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir description:** Big Creek Reservoir is a 520-acre impoundment located in Delta County, Texas, on Big Creek, a tributary of the South Sulphur River. The reservoir was constructed by the City of Cooper for municipal water supply. At conservation pool elevation, habitat consists primarily of featureless banks and the littoral area contains several species of native aquatic plants with American lotus being the most abundant. The invasive aquatic plant Eurasian watermilfoil was also present.
- **Management history:** Important sport fish include largemouth bass, white crappie, and channel catfish. Florida largemouth bass were stocked at a rate of 238/acre in spring 2007.
- **Fish community**
 - **Prey species:** No assessment was made of prey fish populations because of the inability to access the lake during fall 2011. Previous surveys have shown populations of gizzard shad, threadfin shad, bluegill, and redear sunfish.
 - **Catfishes:** All channel catfish collected during gill netting were of harvestable size, and abundance was good. Lack of recruitment into the population was likely a result of predation by largemouth bass. No blue or flathead catfish were collected during the spring 2012 survey.
 - **Largemouth bass:** Catch of largemouth bass in fall 2009 was low compared with previous surveys. Few fish were collected in spring 2012 and the sample was dominated by legally-harvestable fish. Body condition was depressed and may have been a result of spawning.
 - **Crappies:** No assessment was made of crappie populations because of access difficulties in fall 2011. Both white crappie and black crappie are present.

Management strategies: Continue to monitor the largemouth bass population using biennial electrofishing surveys to evaluate the effect of stockings of Florida strain fingerlings conducted in 2007. Continue with standard monitoring using electrofishing in 2015 and gill netting in 2016 and optional trap netting 2015.

INTRODUCTION

This document is a summary of fisheries data collected from Big Creek Reservoir June 2011 through May 2012. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other species of fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2011 and 2012 data for comparison.

Reservoir Description

Big Creek Reservoir is a 520-acre impoundment constructed in 1987 on Big Creek, a tributary of the South Sulphur River. The reservoir is located in Delta County approximately 15 miles north of Sulphur Springs, Texas, and is operated and controlled by the city of Cooper. Primary water use is for municipal water supply. Habitat at time of sampling consisted of natural shoreline with a littoral area comprised of native vegetation with limited quantities of standing timber. The reservoir periodically has dense stands of American lotus and/or Eurasian watermilfoil, which can limit angler access. Boater access consists of one public boat ramp. Bank angling access was poor because of dense growths of aquatic and terrestrial vegetation along the shoreline near the public access area. Other descriptive characteristics for Big Creek Reservoir are in Table 1.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Jubar and Storey 2008) included:

1. Monitor the largemouth bass population.
Action: A fall largemouth bass-only electrofishing survey was conducted in 2009 but insufficient fish in the target length range were collected for age and growth assessment. Genetic analysis was postponed until fall 2011. In fall 2011, the lake was inaccessible because of low water levels resulting from drought. A largemouth bass-only electrofishing survey was conducted in April 2012 to assess the population. Low sample sizes precluded the assessment of age, growth, and genetics.
2. Improve access facilities for anglers.
Action: A management plan (Appendix C) was presented to the City of Cooper in February 2009 outlining recommended improvements to angler access facilities. No observable improvements have been made. In February 2011, Big Creek Reservoir was included for consideration of Boater Access funding for vegetation treatment of a 3-acre area of Eurasian watermilfoil and American lotus, which impaired access to the boat ramp and fishing pier. In June 2011, the boat ramp at Big Creek Reservoir was added, again, to the Division's list of projects eligible for Recreational Boating Access funds because of its high priority need for extension.
3. Promotion of fisheries resources.
Action: The fisheries resources of Big Creek Reservoir were promoted when anglers inquired about fisheries resources on smaller District reservoirs.

Harvest regulation history: Sport fishes in Big Creek Reservoir are currently managed with statewide regulations (Table 2).

Stocking history: Florida largemouth bass (FLMB) were initially introduced into Big Creek Reservoir in 1988 and stocked again in 1989, 1990 and 1998 through 2000. The most recent stocking took place in 2007. Blue catfish were introduced in 1988, and stocked twice more, but no blue catfish have been sampled. Channel catfish were introduced in 1989 and stocked again in 1991. The complete stocking history is in Table 3.

Vegetation/habitat history: In September 2007, Big Creek Reservoir had a high abundance of aquatic

vegetation (52.8%). American lotus was the most abundant species (32.4%) and native submerged vegetation accounted for 14.7% of reservoir surface area. Natural shoreline was the most abundant habitat component (90.4%).

Water transfer: Big Creek Reservoir is primarily used for municipal water supply, recreation, and to a lesser extent, flood control. The City of Cooper is currently the only entity transferring water from the reservoir.

METHODS

Fishes were collected by electrofishing (1 hour at 12, 5-min stations), and gill netting (5 net nights at 5 stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing and, for gill nets, as the number of fish caught per net night (fish/nn). All survey sites were randomly selected and the gill netting survey was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). The spring electrofishing survey was conducted during the daytime but the methodology used was otherwise the same as in the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), as defined by Guy et al. (2007)], and relative weight (W_r) were calculated for target fishes according to Anderson and Neumann (1996). Relative standard error ($RSE = 100 \times SE$ of the estimate/estimate) was calculated for all CPUE statistics and SE was calculated for structural indices and IOV. No age and genetics information was available because population samples of largemouth bass were inadequate for analysis.

Aquatic vegetation and habitat surveys were not conducted because the reservoir was not accessible at the recommended time of sampling because of low reservoir water elevation.

RESULTS AND DISCUSSION

Prey species: No assessment was made of prey fish populations because of the inability to access the reservoir during fall 2011. Previous surveys have shown populations of gizzard shad, threadfin shad, bluegill, and redear sunfish (Jubar and Storey 2008).

Channel catfish: The gill net catch rate of channel catfish in 2012 (12.4/nn) was higher than in 2008 (3.4/nn) (Figure 1). Channel catfish were in good body condition, indicating access to ample prey.

Largemouth bass: Electrofishing catch rate in fall 2009 (46.0/h) was poor as compared with surveys conducted in 2007 (239.0/h) and 2006 (116.0/h). Body condition in 2009 was also depressed as compared with the previous surveys. Low water levels prevented sampling in fall 2011. The population was sampled in spring 2012 but CPUE was poor and body condition of most size classes of fish was less than 90. At time of sampling, turbid water from recent rainfall may have affected sampling efficiency. In addition, the sampling was conducted during daytime, which may have resulted in reduced catch.

Crappie: Both white crappie and black crappie are present in Big Creek Reservoir, but no assessment was made of crappie populations because of access problems in fall 2011.

Fisheries management plan for Big Creek Reservoir, Texas

Prepared – July 2012

ISSUE 1: Big Creek Reservoir has shown the potential to produce trophy largemouth bass as evidenced by the size of the current lake record, 14.06 pounds (3/1996), and a 13.19 ShareLunker entry (3/2000). Florida largemouth bass were stocked in 2007. District staff should continue monitoring the largemouth bass population to determine the impact of the FLMB stockings and to evaluate the need for future stockings when appropriate.

MANAGEMENT STRATEGIES

1. Conduct additional electrofishing survey during fall 2013 to collect age information (Category 2) and to monitor the largemouth bass population.
2. Conduct genetic analysis on fish from multiple age classes sampled during fall 2013 electrofishing.

ISSUE 2: Shoreline access is limited near the boat launch and the ramp is in need of repairs. Although the City of Cooper repaired the fishing pier in 2008, the boat ramp and launch area are still in need of improvement. The end of the functional boat ramp has eroded and under low water conditions, trailers can easily drop off the end of the ramp. American lotus and cattails are encroaching on the boat ramp, which limits access.

MANAGEMENT STRATEGIES

1. Work with the City of Cooper to assist them in securing funding through TPWD for making improvements to the boat ramp area.
2. Recommend herbicide treatments to control invasive vegetation in the vicinity of the boat ramp.

ISSUE 3: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches, and plugging engine cooling systems. Giant salvinia and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing, and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Contact and educate marina owners about invasive species, and provide them with posters, literature, etc. so that they can in turn educate their customers.
3. Educate the public about invasive species through the use of media and the Internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups.
5. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes additional electrofishing 2013, and mandatory monitoring, including a summer vegetation and habitat survey, fall electrofishing, spring gill netting, and an access survey in 2015-2016 (Table 6). During the additional electrofishing survey in 2013, an attempt will be made to collect age and genetics samples from the largemouth bass population. Gill net surveys are only necessary every four years to monitor channel catfish recruitment and abundance.

LITERATURE CITED

- Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.
- Guy, C. S., R. M. Neumann, D. W. Willis, and R. O. Anderson 2007. Proportional Size Distribution (PSD): A further refinement of population size structure index terminology. Fisheries 32(7):348.
- Jubar, A.K. and K.W. Storey 2008. Statewide freshwater fisheries monitoring and management program survey report for Big Creek Reservoir, 2007. Texas Parks and Wildlife Department, Federal Aid in Sport Fish Restoration, Performance Report, Project F-30-R-33, Job A, 20 pages.

Table 1. Characteristics of Big Creek Reservoir, Texas.

Characteristic	Description
Year constructed	1987
Controlling authority	City of Cooper
Surface area	520 acres
Counties	Delta
Reservoir type	Tributary
Mean depth	12.0 ft.
Maximum depth	31.0 ft.
Shoreline Development Index (SDI)	3.52
Conductivity	160 μ mho / cm
Secchi disc range	1 – 2 ft.
Watershed area	11.7 mi ²

Table 2. Harvest regulations for Big Creek Reservoir.

Species	Bag limit	Minimum-Maximum length (inches)
Catfish: channel and blue catfish, their hybrids and subspecies	25 (in any combination)	12 - No limit
Catfish: flathead	5	18 - No limit
Bass: largemouth	5	14 - No limit
Crappie: white and black crappie, their hybrids and subspecies	25 (in any combination)	10 - No limit

Table 3. Stocking history of Big Creek Reservoir, Texas. Size categories are: FGL = 1-3 inches; AFGL = 8 inches, and ADL = adults.

Species	Year	Number	Size
Gizzard shad	1988	60	ADL
	Total	60	
Threadfin shad	1991	1,200	ADL
	Total	1,200	
Blue catfish	1988	26,000	FGL
	1990	5,269	AFGL
	1991	26,135	FGL
	Total	57,404	
Channel catfish	1989	13,000	FGL
	1991	13,000	FGL
	Total	26,000	
Coppernose bluegill	1988	150,626	
	Total	150,626	
Florida largemouth bass	1988	54,057	FGL
	1988	625	AFGL
	1989	10,988	FGL
	1990	38,578	FGL
	1990	2,108	AFGL
	1998	52,894	FGL
	1999	51,960	FGL
	2000	4,500	FGL
	2007	123,860	FGL
	Total	339,570	
White crappie	1988	26,000	FGL
	Total	26,000	

Channel catfish

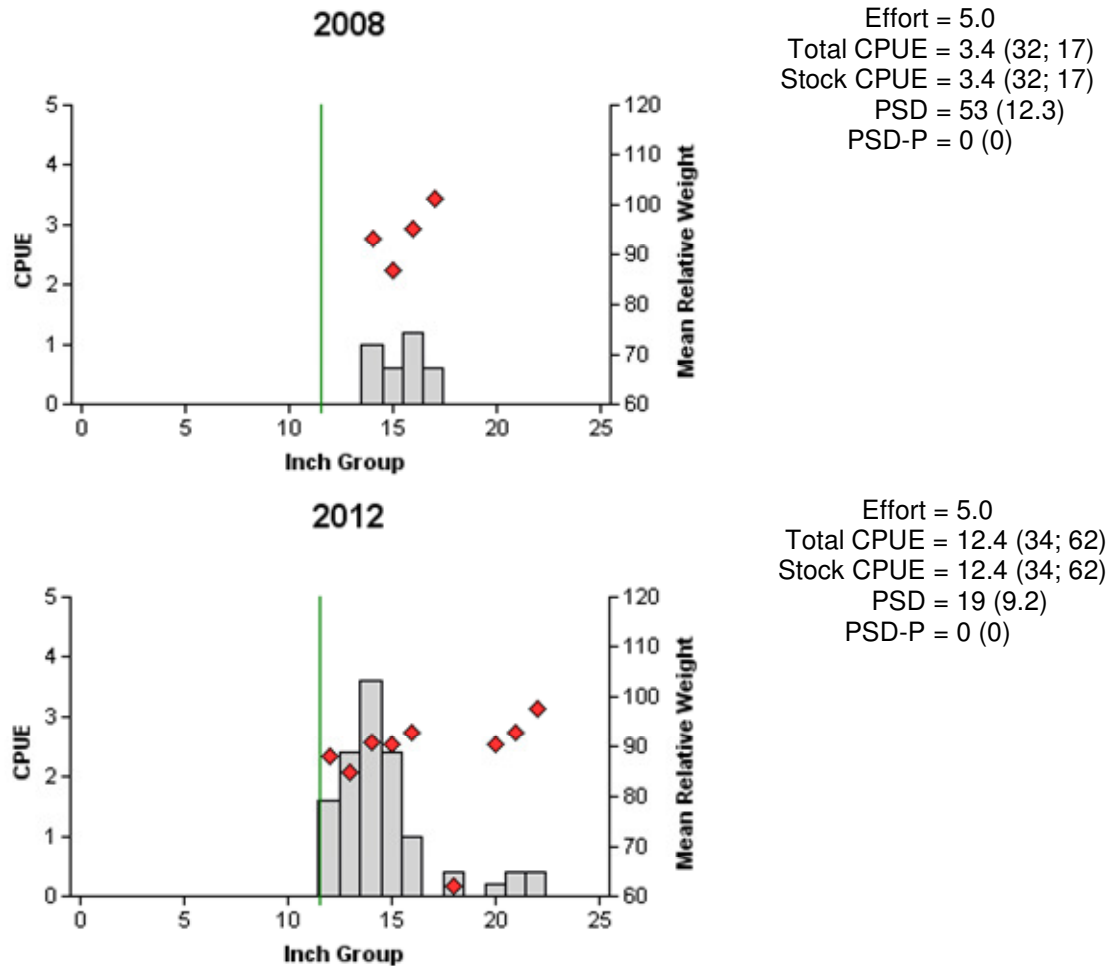


Figure 1. Number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses for spring gill net surveys, Big Creek Reservoir, Texas, 2008 and 2012. Vertical lines indicate minimum length limit at time of survey. No channel catfish were captured in the spring 2004 survey.

Largemouth bass - Fall

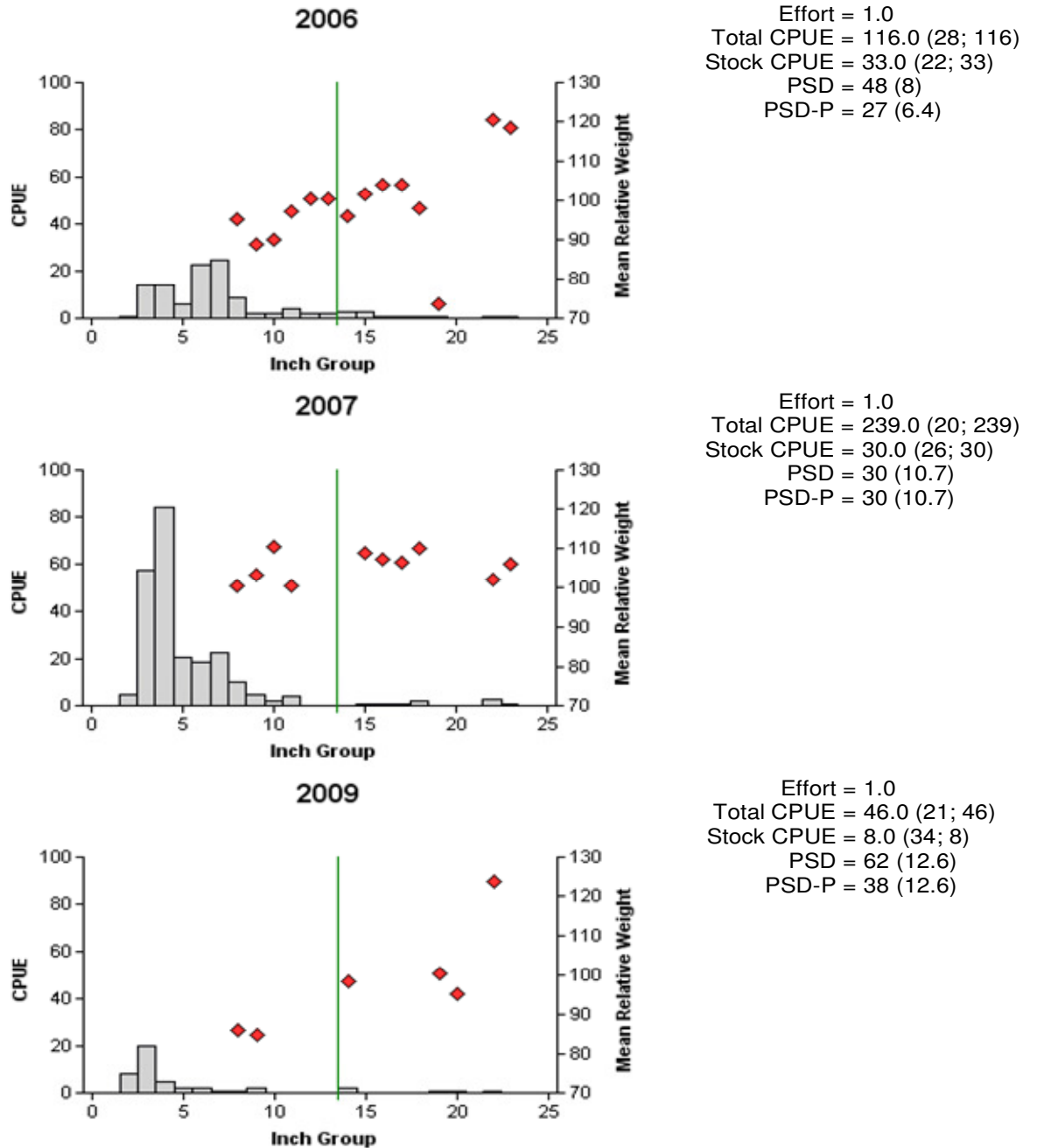


Figure 2. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Big Creek Reservoir, Texas, 2006, 2007, and 2009. The 2006 and 2009 surveys were bass-only. Vertical lines indicate minimum length limit at time of survey.

Largemouth bass - Spring

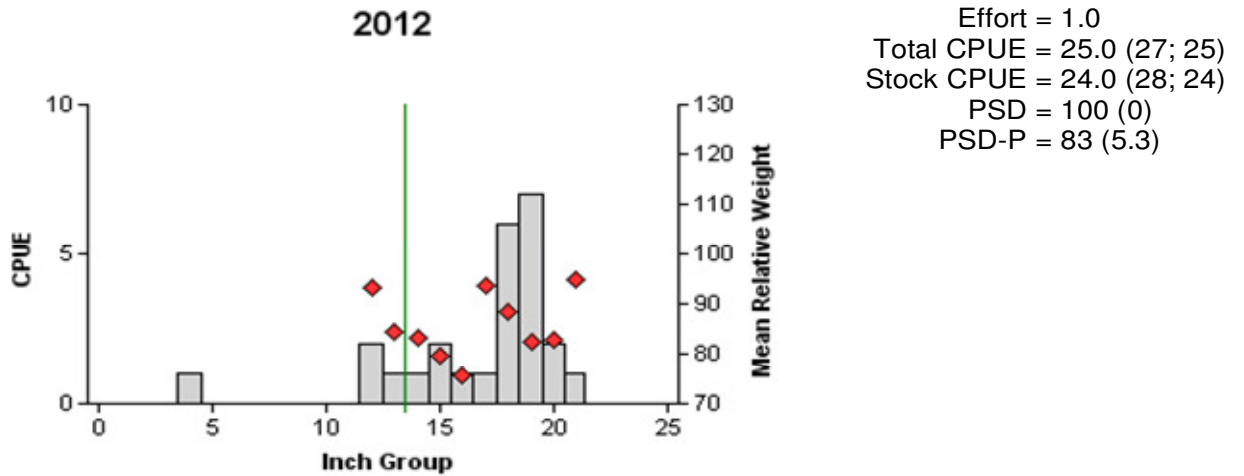


Figure 3 Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring electrofishing survey, Big Creek Reservoir, Texas, April 2012. The survey was for bass-only. Vertical line indicates minimum length limit at time of survey.

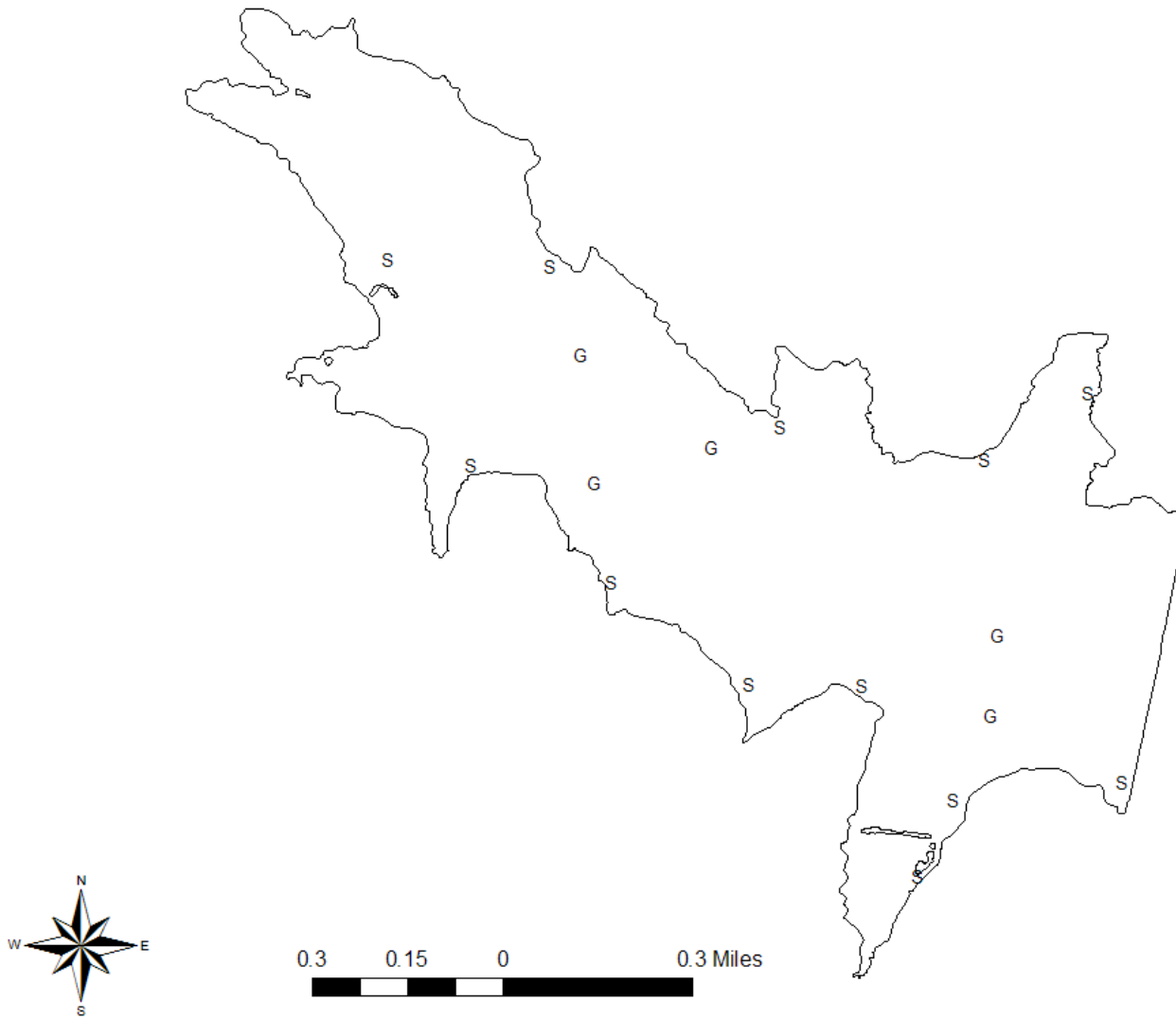
Table 4. Proposed sampling schedule for Big Creek Reservoir, Texas. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

Survey Year	Electrofishing	Gill netting	Trap netting	Vegetation/ Habitat	Access survey	Report
June 2013- May 2014	A					
June 2015- May 2016	S	S	A	S	S	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Big Creek Reservoir, Texas, 2011-2012.

Species	Gill Netting		Electrofishing - Spring	
	N	CPUE	N	CPUE
Channel catfish	62	12.4		
Largemouth bass			25	25.0

APPENDIX B

Location of spring gill net (G) and spring electrofishing sites (S), Big Creek Reservoir, Texas, 2011-2012.

APPENDIX C

Proposed management plan for Big Creek Reservoir presented to the City of Cooper

1. Small-scale projects –TPWD Renovation grant

- Resurface lower end of ramp – score surface with concrete saw to provide traction, prevent slippage of trucks and anglers on ramp when lake level is low.
- Mark end of boat ramp with pole (to reduce incidence of trailers dropping into 'washout' at end of the ramp).
- Add rock fill at end of ramp to fill 'washout' created by outboard propwash.
- Remove cattails on either side of ramp using a trackhoe.
- Replace security lights.

2. Large-scale projects – Federal Renovation grant

- Install courtesy (loading) dock at boat ramp.
- Extend boat ramp through construction of cofferdam.

3. City-funded projects

- Close end of fishing pier – this presents a falling hazard.
- Fill in eroded area at base of fishing pier – someone could get hurt
- Control aquatic vegetation (American lotus & Eurasian watermilfoil) in vicinity of the fishing pier using SePro Reward herbicide and a suitable surfactant. This herbicide treats both of these plants and (see enclosed label) is a good candidate since the water intake structure is over 1,100 ft away and at the recommended treatment rate (2 qt/acre) there is no setback distance (minimum distance of treatment from intake). The affected area extends from north of the fishing pier to the boat ramp and westward to the point. I have estimated a treatment area of approximately 3 acres. This chemical is sold in 2.5 gallon jugs which retail for \$250. The entire jug would treat about 5 acres. Glyphosate-based herbicides are often used to treat lotus, but they require a setback distance of ½ mile. The treatment should be done by a licensed applicator and it will require application by boat or an effective treatment. Before you begin treating any vegetation in Big Creek, you will need to apply for a vegetation treatment proposal, but there is no cost involved and we can walk you through the process.
- Renovate second boat ramp – the vegetation treatment would take care of much of this, but sediment would need to be cleared off the ramp, perhaps by using a trackhoe.